

Mold Neurotoxicity: Validity, Reliability and Baloney

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Introduction

Mold neurotoxicity is an increasingly common allegation in personal injury litigation, although conspicuously absent from the clinic. The current mold neurotoxicity controversy is driven more by lawyers than by scientific disagreements. These claims are variously referred to as brain damage, toxic encephalopathy, cognitive deficits, neurobehavioral deficits, neuropsychological impairment, and as facets of sick building syndrome or environmental illness. The complaints include memory deficits, difficulty concentrating, problems with language and reasoning, mental fatigue, depression, anxiety, and others. The primary problem with the allegations of neuropsychological impairment due to mold inhalation is that speculation has been substituted for scientific reasoning based on empirical data. As of this writing, there is no scientific basis for the allegation that breathing mold spores or mycotoxins in household and commercial office settings causes neuropsychological impairment. We do not know the neuropsychological effects of these exposures. But experts are using naïve and empty arguments such as saying they cannot think of any reason that a person suing for millions of dollars might make subjective complaints other than because they inhaled mold, and that the scientific literature does not *disprove* their speculative opinions. These are junk science arguments.

The complaints plaintiffs have been making in toxic mold cases are variable and nonspecific. They do not constitute a syndrome or pattern of essentially identical complaints from one case to the next. Neither do their neuropsychological test scores fall into a consistent pattern. There is no fingerprint test profile or pattern of complaints generally recognized as being associated with mold neurotoxicity.

The so-called "study" most often cited as evidence of neuropsychological impairment due to mold neurotoxicity is not actually a scientific study at all. It was not peer reviewed in any conventional sense. The methodology was so weak it will never be accepted for publication in a high quality scientific journal (and as of this writing has never been published in any scientific journal, regardless of quality). The paper purports to have evaluated persons exposed to *stachybotrys atra* but used no control group and did not include a standardized test battery administered to all the participants. Alternative toxic exposures

were not investigated – not even other mold exposures. The participants did not all take the same tests and the author has testified that he only reported data from a few tests he selected as more likely to produce what he was looking for. The neuropsychological test scores of the people studied were notable for being *normal*, not impaired, but lawyers and a small number of experts refer to these findings as evidence of mold neurotoxicity. Furthermore, an examination of the data employed in preparing the manuscript shows that the paper was not a completely accurate reflection what was actually done. In the only other relevant study involving objective testing, as distinct from subjective reports (a study that *was* published in a peer-reviewed journal), the briefly mentioned finding was that the mold cases performed *better* on cognitive testing than the controls (Hodgson et al., 1998). Sudakin (1998) found an increase in self reported neurobehavioral symptoms in a case report but cautioned readers that these individuals had been exposed to reports of adverse health effects of toxigenic fungi exposure prior to making their subjective complaints in hindsight after a delay. These symptoms improved substantially after leaving the building. Many of the people Sudakin studied were making claims for compensation.

Establishing Proof without Evidence

Because their methodology is devoid of objective evidence that mold or mycotoxin inhalation has caused brain injury, so-called "toxic mold" experts are relying heavily on subjective symptom reporting and on tests that are affected by response biases associated with litigation. Their approach is problematic for a number of reasons that will be discussed in more detail below. As noted above, one problem is that there is no known pattern of complaints that constitutes a neuropsychological or psychological syndrome or diagnosable mental disorder associated with mycotoxin inhalation or inhalation of mold spores. Another problem is that experts in litigated cases are ignoring the growing abundance of research showing that patients in litigation behave differently than other persons in important ways that directly affect expert examinations of the patient's condition. Plaintiffs often report their pre-injury history in unusually benign terms, and discount alternative explanations for their complaints, such as important stressors in their lives, to an implausible degree. They respond to neuropsychological tests more frequently in an impaired range even when no one is claiming they have brain damage – not their lawyers, their doctors, or the plaintiffs themselves. In other words, artifacts associated with litigation are affecting neuropsychological test results. Plaintiffs making mild brain injury claims often respond to psychological tests in a more impaired way than persons with documented severe brain injury – again, the test results are contaminated by the biases arising from litigation rather than being a true reflection of the extent of injury. There is growing evidence that attorneys and other advocates associated with litigated claims influence the psychological and neuropsychological evidence in ways that cause misleading and erroneous results. Finally, it is becoming increasingly clear that the amount of effort the patient makes during neuropsychological testing has a greater impact on the test results than the degree of injury, even when including severe brain injuries among the persons studied (e.g., see Green et al., 2001). In summary, the influence of the claims context is such a powerful confounding force that it should be considered in the process of differential diagnosis and ruled out as the most likely explanation for abnormal findings in neuropsychological and psychological evaluations wherever incentives are involved.

Genuinely troubled people become involved in these matters, at times to their detriment. For example, individuals with somatoform characteristics and histrionic personalities tend to be suggestible and therefore vulnerable to zealots and advocates who tell them they are brain-damaged and doomed to suffer permanent deficits caused by their toxic environment. Most of us more or less ignore, or notice and discount common "symptoms of life" such as transient aches and pains, fluctuating ability to concentrate, temporary fatigue, feeling stressed, or inability to recall all sorts of information such as a word or name or where we left something. However, when an expert claims these are symptoms of mold neurotoxicity, a gullible person may focus more attention on these experiences, become alarmed, and become involved in a vicious cycle of over interpreting mild symptoms, becoming anxious, developing more symptoms caused by the anxiety, and becoming even more alarmed, sometimes to the point of virtually obsessing

over the symptoms. It is an easy next step to conclude that because these feelings are more noticeable and more frequent lately they must have been caused by mold exposure as the expert alleges.

Although most of us think of ourselves as not presently suffering the effects of mild brain injury due to mold or anything else, empirical investigations have repeatedly shown that surprisingly high rates of mild brain injury symptoms and psychological symptoms are normal in the general adult population and among student and medical patient populations (e.g., see Dunn, Lees-Haley, Brown, Williams, & English, 1995; Gouvier, Cubic, Jones, Brantley, & Cutlip, 1992; Gouvier, Uddo-Crane, & Brown, 1988; Fox, Lees-Haley, Earnest, & Dolezal-Wood, 1995a, 1995b; Lees-Haley, 1992; Lees-Haley & Brown, 1993). Likewise, prevalence studies show that rates of psychiatric illness are "greater than previously thought to be the case" (Kessler, McGonagle, Zhao, Nelson, Hughes, Eshleman, Wittchen, & Kendler, 1994, p. 8; see also Regier, Boyd, Burke, Rae, Myers, Kramer, Robins, George, Karno, & Locke, 1988; and Robins, Helzer, Weissman, Orvaschel, Gruenberg, Burke, & Regier, 1984). Thus when someone directs attention to a search for psychopathology, it is not hard to find and it is more common than many people imagine. Administration of diagnostic procedures to a random or non-complaining population leads to the detection of false positives and actual pathology that was silent prior to the testing, so it is no surprise that testing a group of plaintiffs leads to discovery of apparent injury whether there is any or not. The *average* person with no history of brain injury produces scores in the impaired range on several tests in a detailed neuropsychological test battery but some experts ignore these base rates ("normal levels of abnormality") and over interpret these findings as indicative of toxic brain injury.

Teaching Eyewitnesses to See Invisible Phenomena

In ambiguous settings such as controversial legal arguments over what is known about mold neurotoxicity, psychological influences assume an increasing importance in determining what is perceived as real. The information disseminated by media, politicians, activists, litigating parties, experts, and attorneys may cause important emotional reactions in the affected people. A claim may be false but it can cause true alarm and genuine emotional distress to innocent people if misleading allegations are taken seriously.

It is critically important to weave good science into the mold neurotoxicity arguments as an antidote to unfounded advocacy. Interested parties are promoting speculation and making arbitrary allegations in such an emphatic way that we are tempted to believe them for illusory reasons. Lawyers and clinicians who cannot wait for facts are relying largely on propaganda and social influence techniques such as social proof, repeated affirmations, appeals to authority, and vividness to persuade people that baseless views are true. *Social proof* is the tendency to believe what other people believe. If an advocate creates the impression that several credible people have concluded that mold caused them brain damage, there is a natural human tendency to agree, and a subtle implication that you are somehow lacking in credibility if you disagree. Identifying a few people who believe a proposition, and encouraging them to go public (especially repeatedly) creates the impression that there are a lot of people out there discovering something real. *Repeated affirmations* – literally just saying your claim over and over – create the impression that the assertion is true. After all, as everyone knows, where there is smoke, there must be dry ice. *Appeals to authority* add weight to these persuasions -- if one or more of the people affirming a belief is authoritative, e.g., a civic leader or expert, more people will be persuaded. Sometimes politicians are persuaded to join in unfounded but politically advantageous rhetoric. If we like the source of an opinion, we are more likely to believe what is said, so if a popular actor, media figure, politician or local hero joins the process, more of us will endorse the perceived reality. *Vivid examples* – especially dramatic, anecdotal case histories – often influence judgments more than dull but more accurate quantitative examples. Presenting a dramatic, close up picture of black mold in a scary manner may generate the feeling in the observer that "this is bad" and permit an unfounded emotional segue into the conclusion that anything that looks this bad must cause whatever harm we are alleging it causes.

In response to recent criticisms of junk science, *anti-science arguments* are on the rise. Advocates tell us, "We can't wait on science. We have to act now!" and "The scientists want us to do nothing! How many people have to die before the defendants do what is right?" One such critic ironically declared, "We can't wait on science, we have to act on the evidence!" Certainly we make most of our decisions in life without conducting a scientific study first. However, the allegation that the mold spores that surround us all every day are causing brain damage is a factual question that can only be answered by looking at the data, not by emotional reactions to speculation, sensationalism, and innuendo.

Plaintiffs are Different than Patients without Claims

Patients pursuing litigation report more intense, frequent, and persistent symptoms than non-litigating patients do. For example, a number of prospective studies have found that non-litigating individuals with mild brain injury typically recover from their symptoms within a few months of injury (Barth, Alves, Ryan, Macciocchi, Rimel, Jane, & Nelson, 1989; Dikmen, Ross, Machammer, & Temkin, 1995; Dikmen, McLean, & Temkin, 1986; Gronwall & Wrightson, 1974; Hugenholtz, Stuss, Stethem, & Richard, 1988; Levin, Mattis, Ruff, Eisenberg, Marshall, Tabaddor, High, & Frankowski, 1987). However, recovery of patients in litigation commonly does not conform to expectations, as complaints including memory loss, headache, dizziness, concentration difficulty, blurred vision, photophobia, ringing in the ears, irritability, fatigue, anxiety, and depression (World Health Organization, 1978) continue long after such symptoms normally resolve (Binder, Rohling, & Larrabee, 1997). Numerous empirical investigations have documented discrepancies between patients in litigation and patients not seeking compensation (see e.g., Berry, Wetter, & Youngjohn, 1995; Levin et al., 1987; Youngjohn, Davis, & Wolf, 1997). Fee and Rutherford (1988) compared the frequency of reported symptoms among mild brain injury patients in litigation with those not in litigation. After equating for severity of initial injury, reporting rates were assessed for various symptoms including headache, anxiety, irritability, dizziness, depression, and insomnia. On follow-up, litigating patients reported nearly twice as many symptoms as non-litigating patients.

The differences between self-reported symptoms of litigants and non-litigants have been established with respect to psychological as well as neuropsychological injuries, where compensation-seeking patients have been found to report more persistent psychological symptoms than patients with similar injuries not seeking compensation. Frueh, Smith, and Barker (1996), for example, found that combat veterans seeking service-connected disability for posttraumatic stress disorder (PTSD) obtained significantly more pathological scores on a wide range of psychological inventories and on MMPI-2 validity indices than did combat veterans with equivalent PTSD diagnoses not seeking compensation. Pope, Butcher and Seelen (1993) noted that MMPI profiles of patients with pending disability evaluations exhibit more exaggeration and pathology. Their research also indicated that persons who are genuinely disabled but not awaiting a disability determination tend to produce MMPI profiles with normal scale scores. Patient compensation seeking has been cited as one of the most serious obstacles to successful treatment of PTSD within the VA system (Richman, Frueh, & Libert, 1994). Campbell and Tueth (1997) reported that the system of compensation payments creates a disincentive for recovery and noted that, "Rewarding individuals for pain and disability, particularly on a long-term basis, can have numerous negative consequences, and ultimately may be a disservice to the patient" (p. 42).

Health-care providers have noted fundamental differences between litigating and non-litigating patients, and "have become increasingly suspicious of the genuineness of symptoms exhibited by plaintiffs because of the large disparity often found between subjective complaints and objective findings" (Weissman, 1990, p.71). Compared to non-litigating patients, patients seeking financial compensation may find treatment withheld because plaintiffs are perceived as resistant and noncompliant with psychotherapeutic and rehabilitative services. In the context of litigation or similar applications for compensation where incentives such as settlement may outweigh incentives such as getting better,

compliance with treatment may be postponed or unnecessary treatment sought for appearances.

Recent research suggests not only that litigating patients report current symptoms at higher rates and as persisting longer than do non-litigating patients but that litigating patients tend to recall pre-injury psychological and neuropsychological functioning as superior to controls (Lees-Haley, Williams, & English, 1996; Lees-Haley, Williams, Zasler, Margulies, English, & Stevens, 1997). For example, Lees-Haley et al. (1997) asked litigating and non-litigating patients to recall how problematic specific symptoms, behaviors, and aspects of life were in the past. Compared to non-litigants, patients seeking compensation recalled pre-injury functioning as less problematic on a series of variables relevant to neuropsychological evaluations of "toxic mold" plaintiffs, including concentration, memory, fatigue, depression, anxiety, ability to attend school or work, irritability, headache, confusion, self-esteem, marriage, and relationships with children. Because the apparent severity of injury or loss in functioning is essentially a comparison of pre- and post-injury functioning, a greater apparent difference in functioning from pre- to post-injury creates the impression that more compensation is warranted. Therefore, not taking into account the tendency of plaintiffs to overestimate their pre-injury functioning misleads forensic examiners and triers of fact regarding the severity of the injury.

Exaggeration or Malingering

Malingering is defined as the intentional production of false or grossly exaggerated physical or psychological symptoms motivated by external incentives such as financial gain, obtaining drugs, avoiding work, evading criminal prosecution, etc. (American Psychiatric Association, 1987, 1994). Contrary to what many of us used to believe based on our clinical treatment experience, empirical studies are finding that malingering is a common phenomenon in forensic evaluations. However, the courts were wiser than clinicians, and have long recognized this challenge. References to the problem of fraudulent claims and false testimony recur in published cases and legal commentary throughout the history of law. In the oldest known code of laws, the Code of Hammurabi, participants in the legal system were already addressing the problem (Hammurabi's policy was to slay witnesses who testified falsely) (Johns, 2000). Indeed, the problem of false testimony is the first issue addressed with every witness in every court in every case: "Do you swear to tell the truth, the whole truth, and nothing but the truth, so help you God?"

Patients seeking compensation have more incentives to produce false or exaggerated symptom reports than patients seeking treatment. Over the years, estimates of the proportion of plaintiffs feigning psychological deficits range from a low of 1% (Keiser, 1968) to over 50% (Miller & Cartlidge, 1972). In personal injury cases, feigned cognitive deficits have been estimated at 64% (Heaton, Smith, Lehman, & Vogt, 1978) with 47% of workers' compensation possibly involving malingering (Youngjohn, 1991). Another study estimated the percentage of manufactured memory deficits in patients claiming persistent postconcussive syndrome as being between 33 to 60% (Greiffenstein, Baker, & Gola, 1994). Such studies are relevant because the complaints made by persistent postconcussive plaintiffs are remarkably similar to those of many "toxic mold" plaintiffs, and both often appear to be exhibiting litigation-related response biases. Research by Binder (1993) indicates that 33% of mild brain-injured subjects seeking compensation malingered deficits on psychometric testing. Forensic examiners should consider and rule out the possibility that symptom reports and test results are the product of false presentation by plaintiffs during interviews and exaggeration of symptoms through self-report inventories or tests. It has become the standard of care to consider the possibility of malingering while performing a differential diagnosis in forensic cases.

Some psychologists and psychiatrists claim that plaintiffs are unable to malingering mental disorders or neuropsychological deficits without detection by psychological experts. However, there is substantial empirical support for the fact that naïve individuals can fake psychological and neuropsychological symptoms successfully when provided minimal information about disorders (e.g., Albert, Fox, & Kahn,

1980; Faust, Hart, & Guilmette, 1988; Lamb, Berry, Wetter, & Baer, 1994; Rogers, Bagby, & Chakraborty, 1993; Rogers, Ornduff, & Sewell, 1993; Wetter, Baer, Berry, Robison, & Sumpter, 1993). An early study demonstrated the ability of university students to successfully fake schizophrenia on the Rorschach (Albert et al., 1980). After watching a 25-minute film on schizophrenia, 72% of university students were successful in feigning the disorder compared to 46% who were naïve. In another analog investigation, participants asked to fake brain injury were provided detailed information on the type of validity scales on the MMPI-2 and were given information on how to avoid getting caught. Results showed that this information enabled subjects to produce clinically elevated profiles without significantly elevated validity scales (Lamb et al., 1994).

Individuals not provided with information were able to identify symptoms similar to those of genuine patients on certain kinds of inventories, such as symptom checklists (Lees-Haley, 1989a, 1989b). Research indicates that untrained individuals are able to endorse accurately symptoms and experiences of post-concussion syndrome (Mittenberg, DiGiulio, Perrin, & Bass, 1992) as well as major depression, generalized anxiety disorder, and PTSD (Lees-Haley & Dunn, 1994). The research showing that naïve individuals can simulate psychopathology without raising suspicion of malingering is problematic for evaluators. Information about some psychological and neuropsychological disorders is readily accessible to plaintiffs motivated to deceive. Berry (1995) points out that "Fabricators may become familiar with psychiatric symptoms through personal acquaintances, perusal of volumes such as the DSM-IV (APA, 1994), textbooks in psychiatry, or even through exposure to lay sources such as magazine articles and movies about individuals with mental disorders" (p. 88).

Attorney Influence

The influence of lawyers provides another confound to the unbiased evaluation of patients involved in litigation. Although psychological experts have been slow to realize the extent of the problem, concern about attorneys affecting examinations is not a novel concept in legal circles. In California the problem is salient enough that the California Code of Civil Procedure specifically offers protection against disruption of independent psychological examinations by not permitting lawyers to sit in on psychological evaluations (See CCCP 2032(g), e.g., at <http://caselaw.lp.findlaw.com/cacodes/ccp/2016-2036.html>). In the Federal Court case Ragge v MCA/Universal Studios 165 F. 605 (Cal. 1995) the judge heard arguments about whether the patient would be allowed to discover the specific tests the examiner would administer prior to the psychological examination and whether a third party would be permitted to sit in on the evaluation. The court decided that a third party observer should not be allowed to be present during the evaluation and that the psychologist should not be required to disclose specific tests intended for use during the examination. Such disclosures are an invitation to fraud as well as to innocent causes of invalid results.

According to University of Pennsylvania law professor Geoffrey Hazard, who is a member of the ABA Ethics 2000 Commission, lawyers are supposed to learn facts from their clients, not engage in invention, "But the fact of the matter is, lawyers do tell their clients what to do, indirectly... How artificial they are, how artful, varies..." (cited in Dolan, 1994, p. A17). Resnick noted that, "Once an individual becomes a litigant in a personal injury suit... the efforts of attorneys for both the plaintiff and defendant may alter the patient's attitudes and the course of the illness" (1988, p. 88).

Attorneys influence psychological data by a variety of means. They advise their clients how to respond to psychological tests, make suggestions of what to tell examining psychologists and what to emphasize, and lead patients not to disclose certain information important to psychologists. Attorneys prompt their clients to take actions which affect the clinical history and create misleading data concerning the impact of an injury, e.g., telling them that it "would look better" if they not return to work, and that "it might be worth their while to see a doctor every week" (Rosen, 1995, p. 84).

Some attorneys supply claimants with information not only about symptom inventories but also about psychological tests for detecting malingering (see, e.g., Baer, Wetter, & Berry, 1995; Dolan, 1994; Legate, 1996; Lees-Haley, 1997; Platt & Husband, 1986; Rosen, 1995; Taylor, Harp, & Elliott, 1992; Wetter & Corrigan, 1995; Youngjohn, 1995). As Youngjohn (1995) observed, "Psychologists and neuropsychologists performing forensic examinations typically assume that their patients have not been prepared or 'educated' prior to examination" (p. 282). Baer, Wetter, & Berry (1995) note that "given the increasing likelihood that coaching of test-takers may be occurring in a variety of settings, it is important for clinicians to understand its impact" (p. 198).

Further evidence of the willingness of attorneys to interfere with psychological assessment was offered by Wetter and Corrigan (1995). These researchers conducted a survey in which 63% of attorneys surveyed felt they should provide plaintiffs with information about psychological test validity measures (47% of attorneys surveyed believe they should "always or usually" provide such information to their client (the plaintiff) before the testing, and another 16% said they should "sometimes" do so). Of the 63% of attorneys who believed they should provide such information, 42% said they should provide "as much [information] as possible" and another 42% said they believed they should provide a "moderate amount of information," for a total of 84%. Youngjohn (1995) reported an attorney who argued that not counseling a plaintiff prior to psychological testing is legal malpractice. Other research with plaintiffs in personal injury litigation confirms the existence of coaching, specifically in cases related to the psychological sequelae of traumatic events (Rosen, 1995).

Last night, when I went up the stair, I met a man who wasn't there...

When plaintiffs who are undergoing neuropsychological evaluations are asked if anyone has talked to them about their evaluation, almost without exception they say no, except that it is fairly common for them to add that their attorney told them to tell the truth. However, later in the evaluation, it is common for a question to be answered with variations of "My attorney said I don't have to answer that." In some evaluations this reply is made several times, despite the denial of having talked with anyone prior to the evaluation. Since attorney-client communications are privileged unless the attorney and client are conspiring to commit fraud, e.g., if the attorney is helping a plaintiff malingering, psychologists usually do not explore attorney coaching directly in the interview. However, spontaneous comments such as these teach us that many plaintiffs are counseled about how to conduct themselves in a psychological evaluation. University of Michigan Law School attorney Larry Cohen (personal communication, March, 1997) reported that some attorneys consider it part of attorney-client privilege to instruct the client to deny that the coaching ever took place.

Although attorneys are reluctant to discuss privileged communications with specific clients, they publicly share relevant information in continuing legal education courses. Consider for example the advice offered in one national meeting of attorneys, in which attendees were advised to talk to the psychologists they retain "about what kind of history they will want to take..." (Bureau of National Affairs, 1994, p. 52). An attorney on the panel of this conference said she talks to psychologists before their evaluations and "I tell them what areas I don't want them to probe" (p. 52). In another continuing legal education program attorneys were taught to prepare clients for their independent evaluations (IMEs) (Legate, 1996). In this course they were discouraged from sending clients to independent examinations without advance preparation by counsel. They were advised to review and "clarify" the client's symptoms before the IME, and cautioned not to assume the unprepared client would be consistent. One suggestion was to "Consider the creation of a symptoms list that you will review with your client on a regular basis" (Legate, 1996, p 5). Do plaintiffs really need lawyers to tell them where it hurts? A two year old can tell you that. Do lawyers think people in serious pain do not notice it and forget that they are hurting in the absence of protection and assistance from legal counsel?

In a widely circulated legal journal, Taylor, Harp and Elliott (1992) published an article on "preparing" the mild brain injury plaintiff. These attorneys suggest taking "steps to enhance the client's ability to remember key facts" (p. 67). They recommend that "counsel should begin to prepare the plaintiff to testify from the outset of the case" and provide a list of steps to follow prior to depositions and prior to trial (p. 68). Noting that brain-injured clients "...tend to be somewhat uncomfortable with the process [of testifying (Does anyone find it comfortable?)]" they suggest that "...attorneys must take great care in getting them ready to testify" (p. 68). They recommend providing "instructions regarding presentation, demeanor, and dress" when testifying. It is difficult to imagine there being no effects at all on a plaintiff's perception after prolonged exposure to a persuasive advocate repeatedly reframing the data from a litigator's special perspective, in a litigator's convincing language.

If attorneys go to these lengths to prepare a client for a deposition or trial, it is unreasonable to presume they are not advising their clients before medical and psychological examinations that potentially have a major impact on the value of the case. Guidance such as instructions on demeanor, presentation, dress, and memory all may affect the mental status examination by the psychological expert. A histrionic, hypochondriacal, or deceitful plaintiff provided with the coaching proposed in this article could learn to behave in a misleading fashion. The potential effects of such instructions on a borderline or delusional patient are unpredictable but a matter of concern.

Influence of Health-Care Professionals

Psychological experts also confound data in personal injury litigation. For example, in the unpublished case of Lailhengue v Mobil (Civil Action No. 90-4425, United States District Court for the Eastern District of Louisiana), a psychiatrist interviewed plaintiffs with an attorney present. The psychiatrist gave plaintiffs copies of the diagnostic criteria from the Diagnostic and Statistical Manual to review prior to a second meeting investigating whether plaintiffs were suffering Posttraumatic Stress Disorder symptoms. In another unpublished case sealed by the court, a fairly prominent psychologist and an attorney stood before an audience of plaintiffs while the psychologist described symptoms of Posttraumatic Stress Disorder, immediately after which plaintiffs were administered a Posttraumatic Stress Disorder scale of the MMPI with no accompanying validity scales.

Although attorneys and other interested parties can assist a plaintiff motivated to exaggerate or manufacture symptoms, there are other contextual factors of litigation that can induce honest litigants to unintentionally magnify existing complaints or to discover new ones. Repeated physical and psychological examinations by health care professionals can have these unintended effects. As Lishman noted, "The repeated rehearsal of symptoms before a variety of audiences, some encouraging, some skeptical, does not help the patient to be clear about what he is truly experiencing" (1986, p. 463). Platt and Husband (1986) observed that:

By the time the patient/litigant arrives at the clinician's office, he or she often has consulted not only an attorney but a host of medical and allied health professionals as well ... Patients may well pick up cues from their attorneys or treating professionals as to the symptoms they might be expected to have. The questions asked and the messages communicated by these professionals regarding the patient's physical and mental condition can have the effect of covertly or even overtly alerting the patient to additional symptoms he or she had not reported or had not emphasized in previous evaluations, as well as potentially serving to reinforce existing symptoms (p. 35).

Experts' expectancies in assessment are important to consider because they can have important unintended effects on clinical opinion. There is a substantial and growing literature relevant to understanding the nature and consequences of clinician expectancies on psychological assessment (see

e.g., Arkes, 1981; Blank, 1993; Chapman & Chapman, 1967; 1969; Dawes, 1994; Golding & Rorer, 1972; Salovey & Turk, 1991; Smith, 1988; Snyder, 1981; Snyder & Thomsen, 1988; Starr & Katkin, 1969; Turk & Salovey, 1988). For example, Temerlin (1968) demonstrated the influence of expectancies on interpretation of behavior in a clinical setting. Prior to listening to a recording of a benign interview with a normal man, psychiatrists overheard a prestigious colleague characterize the stimulus person as mentally ill. Data elicited during the interview, however, were neutral with respect to pathology. Nevertheless, 60% of the psychiatrists judged the man psychotic, with the remaining 40% diagnosing him with a neurotic or character disorder. None of the control judges (not given a diagnostic category) characterized the target as psychotic. In a related study, clinicians expecting to observe a "patient" judged the person as more disturbed than did clinicians expecting to observe a "job applicant" (Langer & Abelson, 1974), based upon otherwise identical data.

These studies have critically important implications for evaluators. Preconceived beliefs and prior expectations can influence interactions of evaluators and patients. Expectations can evoke behavioral confirmation processes whereby patient behavior is shaped in ways supporting hypotheses of evaluators (see e.g., Snyder & Thomsen, 1988). Both the gathering and interpretation of data may be affected by these preconceptions. Clinicians may attend selectively and elicit from patients' self-report information supportive of hypotheses. For example, during interviews, clinicians convinced that mold exposure causes cognitive deficits may inadvertently or intentionally communicate their expectancies to patients and thereby differentially reinforce self-reports. Plaintiffs, in turn, often minimize data related to alternative explanations for deficits (e.g., reported consumption of drugs and alcohol and important stressors), thereby increasing the salience of causative factors deemed relevant by evaluators and attorneys. When experts enter evaluations with implicit assumptions that patients' injuries were caused by factors identified in the legal claims, a self-fulfilling prophecy can be realized whereby relations between the identified cause and deficits are perceived where none may actually exist (for a discussion of self-fulfilling prophecy see Rosenthal & Jacobson, 1968).

Finally, the intellectually bankrupt tactics of some experts we see in mold cases deserve to be exposed for what they are. Instead of arguing from facts and reason, they use junk science arguments. In one case the expert characterized the opinions of skeptics of mold neurotoxicity claims as "tobacco industry" tactics when he could not refute criticism with evidence and logic. With this accusation the expert was implicitly suggesting that experts retained by the defendants actually know mold causes whatever injuries are alleged but will not tell anyone. Some experts involved in these cases are using alarmist language that is more likely than not to cause emotional distress to a patient who takes the expert seriously, while the true effects of molds remain unknown.

The World Wide Web

Many plaintiffs perform Internet searches that expose them to claims and opinions of wildly varying reliability and validity. Although certain websites are a great aid to legitimate research, there is some risk that innocent but suggestible persons will accept misinformation, hyperbole and speculation as fact. Attorneys, clinicians and various other interested parties are posting a plethora of information on the web. On March 18, 2002 I entered "toxic mold" on Google.com and found 63,400 hits. On AltaVista there were 23,426 hits. At the top of all the 63,400 results on Google.com was the headline, "Learn about the side effects of toxic mold!" Beneath this headline, was there a referral to a scientist or physician or toxicologist? No. There was a hypertext referral to www.injurylawyershop.com, which led immediately to <http://www.toxicmoldinfocenter.com>, a site introduced with the line "*Toxic Mold info and access to attorneys who specialize in Mold litigation.*"

At <http://www.doctorfungus.org/> a variety of information was presented but at the top center of the web page there was news about someone suing for \$65 million. This is not unique. Scanning another website

called "Toxic Mold and Tort News Online Safety, Prevention, and Information" at <http://www.toxic-mold-news.com/> we found the following introductory statement: "The Toxic Mold Website is a comprehensive guide to information regarding mold, toxic mold, safety, and prevention. Our site also provides important legal rights and information for those who have been adversely affected by Toxic Mold in their home, workplace, and elsewhere." After a couple of introductory paragraphs about "potentially fatal dangers" and legal rights there were four paragraphs of news, all four of which were about how much money people won in mold cases.

At The Mold Source at <http://www.themoldsource.com/starter.html> there was a list of medical-legal experts about whom the following claim was stated: "The following professionals have established themselves, through their dedication, commitment and their overwhelming concern for mankind, as the experts. They are the best the world has to offer "us", the fungi contaminated. Collectively, they retain the majority of all known knowledge on fungi and fungal poisoning related illnesses..." The point is not to question the sincerity or integrity of the unidentified author of these views. The point is to illustrate the intensity of apparent belief that we see in these cases and provide a source of examples of "toxic mold" experts identified as deserving of such admiration.

The Toxic Mold Survivors Information and Support Group at <http://toxicmoldsurvivors.com/home.htm> provides a warning at the top of their home page about potential adverse health effects of molds (including *Stachybotrys*, *Aspergillus* & *Penicillium*, it would appear, based on their being identified beneath the headline "Poisoned by Toxic Molds?"). This site tells us that potential adverse health effects include "neurotoxic:-toxic encephalopathy" [sic], memory and verbal problems, fatigue, malaise, vertigo, dizziness, and depression. Although ostensibly a website for a support group, litigation appears to be a major interest of these "survivors." For example, the home page provides links to "Litigation" and "Next Asbestos?" (an article entitled "Toxic mold... The Next Asbestos?" by Sylvia Hsieh of Lawyers Weekly USA), plus links to the websites of lawyers and expert witnesses who testify in toxic tort litigation.

Time magazine's Anita Hamilton, in her June 24, 2001 article "Beware: Toxic Mold" warned us that "Like some sort of biblical plague, toxic mold has been creeping through homes, schools and other buildings across the U.S." She went on to say, "The biggest winners are the industries feeding off mold mania."

Sacramento Bee Staff Writer Andrew LePage wrote an article dated January 20, 2002 entitled "Experts taking issue with 'toxic mold'" that included the following remark: "Paul Scoggins, an environmental engineer with the U.S. Environmental Protection Agency, sums up the use of the term 'toxic mold' this way: 'It sells.'"

Conclusion

As of May 2002, the answer to the question posed to neuropsychologists, whether inhalation of mycotoxins or mold spores causes neuropsychological impairment, is "We don't know." We probably should be a bit cautious about presuming without evidence that throughout the history of medicine, toxicology and neuropsychology virtually every expert on earth except a few favored by attorneys in toxic tort litigation has completely overlooked something present in every office and home that is disabling people in epidemic proportions by damaging their brains. However, there is so little literature and the potential field of investigation is so vast that clear answers will not be established soon. One expert estimated that there are close to 100,000 recognized species of fungi (Terr, 2001). Given the number of possible exposures under different environmental circumstances to persons in dramatically different mental and physical condition, one can speculate about anything. But speculation is not evidence.

The mold neurotoxicity debate is not simply about health care and science – a focus on money and litigation is pervasive in the communications of the toxic mold promoters. The campaign being waged to convince people of the dangers of "toxic mold" is important because this is not merely an amusing example of folly in modern society. The people who are bypassing scientific evidence and engaging in wholesale dissemination of "toxic mold" rhetoric are not neutral forces. If it turns out that these exposures are neuropsychologically harmless, the hysterical claims and unfounded alarms sounded by lawyers, doctors and others will nonetheless have harmed numerous victims. Who will be responsible for their pain and suffering or emotional distress at being told they are going to die or be permanently brain damaged? On the other hand if we discover evidence of causation of neuropsychological deficits in this area, the findings need to be presented widely in a style most helpful to affected patients, not in sensationalized hyperbole. The cure for misinformation is good information but the treatment is not easy. A substantial number of advocates are bypassing science and making vigorous efforts to make mold neurotoxicity *appear* real *before* we know the truth. But sensationalism, unfounded conjecture and manipulation of perception are no substitute for facts. The way to determine the effects of inhalation of mycotoxins and mold spores is through high quality, well controlled scientific studies, not speculation in adversarial settings.

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